

Uniquely written for microbiologists who use statistical models  
and for modelers focusing on microbial ecology

# MODELING THE ENVIRONMENTAL FATE OF MICROORGANISMS

Edited by Christon J. Hurst

*U.S. Environmental Protection Agency, Cincinnati, Ohio*

The movement and survival of microorganisms in the environment, whether infectious contaminants or beneficial GEMs, is a topic of vital importance to scientists in many fields, including pollution and public health research, wastewater treatment and disinfection, plant pathology, soil science and geology, bioremediation, and applied microbiology and virology. Mathematical modeling is an essential tool in all of these areas. Well-constructed statistical models can help to describe and predict microbial transport and die-off, to quantitate factors controlling viral and bacterial transport, and to evaluate methods for microbial inactivation or disinfection.

This book is a unique synthesis, written both for microbiologists interested in the application of statistical models to their work and for engineers and statisticians who have little experience in microbiology. Its five sections present not only microbiological studies but also their mathematical assessment; not only equations and statistical tools, but the theory behind them. Models of microbial behavior, movement, and survival in the subsurface and groundwaters, in the open on foliage and other surfaces, and under various disinfection conditions are introduced and evaluated by the authors, who represent a wide cross-section of the disciplines concerned with environmental microbiology.

The book's broad scope and unique combination of theory and practice will make it invaluable to almost every investigator of microbial ecology and the environment.

## CONTENTS

### I. WHAT, HOW, AND WHY?

1. Background and Practical Applications of Microbial Ecology (*Updegraff*)

### II. FATE IN THE SUBSURFACE WORLD

2. Problems with Using Existing Transport Models To Describe Microbial Transport in Porous Media (*Dickinson*)

3. Modeling Microbial Transport in the Subsurface (*Yates and Yates*)

4. Quantitation of Factors Controlling Viral and Bacterial Transport in the Subsurface (*Gerba et al.*)

5. Parameters Involved in Modeling Movement of Bacteria in Groundwater (*Harvey*)

6. Use of Models To Predict Bacterial Penetration and Movement within a Subsurface Matrix (*McInerney*)

### III. FATE IN THE SURFACE WORLD

7. Using Linear and Polynomial Models To Examine the Environmental Stability of Viruses (*Hurst*)

8. Development of Models To Explain the Survival of Viruses and Bacteria in Aerosols (*Mohr*)

9. Models for the Survival of Bacteria Applied to the Foliage of Crop Plants (*Knudsen*)

### IV. DISINFECTION

10. Virus Inactivation by Disinfectants (*Vaughn and Novotny*)

11. Model of *Giardia lamblia* Inactivation by Free Chlorine (*Clark*)

### V. BIOFILMS

12. Background and Models for Bacterial Biofilm Formation and Function in Water Distribution Systems (*Olson et al.*)

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# THE RIBOSOME

## STRUCTURE, FUNCTION, & EVOLUTION

Edited by **Walter E. Hill**, *University of Montana, Missoula*; **Albert Dahlberg**, *Brown University, Providence, R.I.*; **Roger A. Garrett**, *University of Copenhagen, Copenhagen, Denmark*; **Peter B. Moore**, *Yale University, New Haven, Conn.*; **David Schlessinger**, *Washington University School of Medicine, St. Louis, Mo.*; and **Jonathan R. Warner**, *Albert Einstein College of Medicine, Bronx, N.Y.*

This comprehensive overview is a major new addition to literature on the ribosome, covering the structure, function, and evolution of this complex macromolecule in both procaryotic and eucaryotic systems. The authors, an international group of leading experts representing 13 countries, have written and illustrated their chapters for use by all life scientists, including those outside the field.

The book opens with a personal, historical retrospective and summary by Masayasu Nomura, followed by historical insights on ribosome preparation by Alexander S. Spirin. From there, chapters turn to recent developments in every arena of research into the ribosome. Much of the current knowledge about the detailed mechanisms by which the ribosome is involved in protein biosynthesis has only recently been delineated thanks to a host of new research techniques. Additional information about how antibiotics and ribosomes interact and a view of the ribosome in its evolutionary context are also included.

Arising from the August 1989 International Conference on Ribosomes, this reference will be extremely useful to advanced students as well as investigators whose work either directly or indirectly touches on this subject.

### CONDENSED CONTENTS

**Historical** (2 chapters by Nomura and Spirin). **Structure of Ribosomes and rRNA** (12 chapters by Noller et al.; Brimacombe et al.; Frank et al.; Boublik, Mandiyan, and Tumminia; Stöffler-Meilicke and Stöffler; Yonath et al.; Ehresmann et al.; Draper; Egebjerg, Larsen, and Garrett; Oakes et al.; Serdyuk et al.; and Wool et al.). **Probing rRNA Function** (4 chapters by Raué et al.; Tappich et al.; Cunningham et al.; and Hill et al.). **Initiation** (5 chapters by Van Knippenberg; Hartz, McPheeters, and Gold; Gualerzi et al.; Merrick; and Munroe and Jacobson). **Elongation** (8 chapters by Liljas; Rheinberger et al.; Zimmermann, Thomas, and Wower; Wintermeyer, Lill, and Robertson; Barta, Kuechler, and Steiner; Hardesty, Odom, and Czworkowski; Ehrenberg et al.; and Möller). **Termination** (2 chapters by Tate, Brown, and Kastner and Murgola et al.). **Ribosome Formation** (7 chapters by Nilsson et al.; Pace and Burgin; Srivastava and Schlesinger; Musters et al.; Warner et al.; Gerbi et al.; and Ware and Khanna-Gupta). **Antibiotic Mechanisms and Probes**

(3 chapters by Cundliffe; Cooperman, Weitzmann, and Fernández; and Ballesta and Lazaro). **Translational Fidelity** (6 chapters by Kurland et al.; Dix, Thomas, and Thompson; Weiss et al.; Buckingham et al.; Bogosian et al.; and Culbertson et al.). **Evolution of Ribosomes** (8 chapters by Gouy and Li; Lake; Gray and Schnare; Wittmann-Liebold et al.; Matheison et al.; Finley, Bartel, and Varshavsky; Amils et al.; and Subramanian, Smooker, and Giese).

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# ADP-Ribosylating Toxins and G Proteins

## Insights into Signal Transduction

Edited by **Joel Moss** and **Martha Vaughan**, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland

**T**he contents of this important synthesis and the expert contributors span the disciplines of microbiology, biochemistry, molecular biology, and pharmacology to review current knowledge about ADP-ribosylating toxins, guanine nucleotide-binding proteins, receptors, and signal transduction. Recombinant DNA technology has been applied to elucidate the molecular basis of action of these bacterial toxins, which are responsible in part for the syndromes characteristic of a number of infectious diseases.

The contents are in three main sections: I. Bacterial ADP Ribosyltransferases: Toxins and Related Proteins (9 chapters); II. Guanine Nucleotide-Binding Proteins Coupled to Signal Transduction in Animal Cells (13 chapters); and III. ADP Ribosylation in Bacteria and Animal Cells (6 chapters).

This book will very effectively update interested scientists and students on the current status of research into ADP-ribosylating toxins and related topics and will point the way for future advances.

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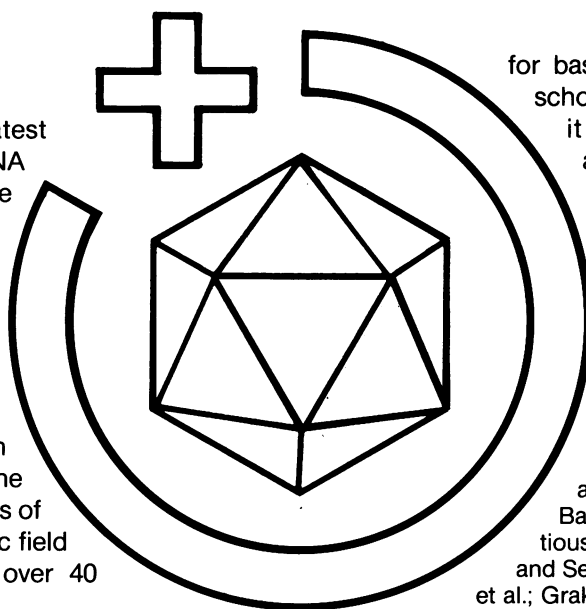
# THE LATEST INFORMATION ON SOME VIRUS "SUPERFAMILIES" — NEW ASPECTS OF POSITIVE-STRAND RNA VIRUSES

EDITED BY MARGO A. BRINTON  
AND FRANZ X. HEINZ

THIS BOOK presents the latest thinking on positive-strand RNA viruses. These include the majority of plant viruses, insect viruses, and animal viruses, including picornavirus, coronavirus, togavirus, flavivirus, poliovirus, and rhinovirus. Arising from the 2nd International Symposium on Positive-Strand RNA Viruses, held in Vienna, Austria, in June 1989, the book is a compendium of reviews of exciting research in this dynamic field currently being performed at over 40 laboratories.

At one time considered divergent in structure, the viruses of the sindbis, polio, and coronavirus superfamilies are increasingly known to share important similarities which allow them to shuffle conserved amino acid units to form new viruses. The implications for plant, animal, and human viral studies, including vaccine and antiviral-compound development, are serious. In addition, the book gives new insight into the diversity of the structure of picornaviruses. The first animal viruses to be crystallized, the picornaviruses have had enormous influence on subsequent discussions of viral structure. Several color plates illustrate the structural projections of these viruses and add to the book's overall usefulness.

The book will be valued both as an update for virologists, molecular biologists, viral immunologists, medical virologists, and researchers in vaccine development and antiviral compounds and as supplemental reading



for basic virology courses in medical schools and universities. In addition, it is highly recommended for advanced courses in positive-strand RNA virology.

## Condensed Contents

Overview: Positive-Stranded RNA Viruses: Early History and the Role of Model Viruses (Kaesberg)

I. Viral Evolution (7 chapters by Goldbach; Spaan et al.; Taylor et al.; Meyers et al.; Dolja et al.; Godeny et al.; and Wright and Cotton.) II. Genome Replication (5 chapters by Hall et al.; Flanagan et al.; Strauss et al.; Leibowitz et al.; and Barton et al.) III. DI-RNAs and Infectious Clones (7 chapters by Giachetti and Semler; Hagino-Yamagishi et al.; Siegl et al.; Grakoui et al.; Wellink et al.; Morris and Knorr; and Roos et al.) IV. Protein Translation, Cleavage, and Modification (10 chapters by Reuer et al.; Howell et al.; Macejak et al.; Simons et al.; Garoff et al.; Parks et al.; Skern et al.; Falk et al.; Feng et al.; and Falgout and Lai.) V. Virion Structure and Assembly (6 chapters by Hogle et al.; Acharya et al.; Chen et al.; Wengler; Schlesinger et al.; and Kirkegaard and Compton.) VI. Viral Receptors, Uptake, and Disassembly (6 chapters by Holmes et al.; Colonno et al.; McClelland and Greve; Merluzzi et al.; Hsu et al.; and Racaniello et al.) VII. Antigenic Structure and Functions (4 chapters by Siddell et al.; Heinz et al.; Kurane et al.; and Strauss et al.) VIII. Molecular Aspects of Pathogenesis and Virulence (5 chapters by Agol; Girard et al.; Calenoff et al.; Johnston et al.; and Kandolf et al.) IX. Strategies for Control of Virus Disease (4 chapters by Baulcombe et al.; Kew et al.; McKinlay et al.; and Andries et al.)

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# MICROBIAL DETERMINANTS OF VIRULENCE AND HOST RESPONSE

Editor: Elia M. Ayoub

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Associate Editors: William C. Branche, Jr., and Timothy J. Henry

THE PROLIFERATION of information on the molecular microbiology of factors involved in microbial virulence prompted this comprehensive new publication. Essentially a survey and evaluation of the current status of research in the related fields of bacteriology, mycology, immunology, and host-parasite relationships, the book offers readers a useful summary of recent advances. Based on a workshop held under the auspices of the Bacteriology and Mycology Study Section of the Division of Research Grants and the National Institute of Allergy and Infectious Diseases, the book contains the following sections and chapters:

## I. Bacterial Factors

1. Regulation of Post-Exponential-Phase Exoprotein Synthesis in *Staphylococcus aureus* (Novick et al.); 2. Streptococcal Immunoglobulin-Binding Proteins (Boyle et al.); 3. Noncapsular Surface Antigens and Their Association with Virulence of *Haemophilus influenzae* Type b (Hansen); 4. Reappraisal of the Chemistry of Mycobacterial Cell Walls, with a View to Understanding the Roles of Individual Entities in Disease Processes (Brennan et al.); 5. Regulation of the Immune Response to *Mycobacterium tuberculosis* (Ellner et al.); 6. Role of Major Histocompatibility Complex (MHC) and Non-MHC Genes in Host Resistance and Susceptibility to Mycobacteria (Buschman et al.); 7. Role of the Capsular Polysaccharide of Type III Group B Streptococci in Virulence (Kasper et al.).

## II. Fungal Factors

8. Immunobiology of *Histoplasma capsulatum*-Reactive T Cells (Deepe); 9. Gamma Interferon and Experimental Murine Histoplasmosis (Wu-Hsieh and Howard); 10. Macrophage Oxidation of L-Arginine Is Linked to Fungistatic Capability (Granger et al.); 11. *Candida albicans* Acid Proteinase: a Role in Virulence (Ray and Payne); 12. Adherence of *Candida albicans* to Mammalian Cells (Edwards and Mayer).

## III. Bacterial Factors in Sexually Transmitted Diseases

13. Pilus and Outer Membrane Protein II Variation in *Neisseria gonorrhoeae* (Swanson); 14. Outer Membrane Proteins of *Neisseria gonorrhoeae* (Elkins and Sparling); 15. Cellular and Molecular Pathogenesis of Syphilis (Blanco et al.); 16. Chlamydial 57-Kilodalton Stress Response Protein Is a Deleterious Immune Target (Morrison).

## IV. Biologic Factors

17. The Neutrophil NADPH Oxidase System: Molecular Aspects (Clark); 18. Lipopolysaccharide Signal Modification by Acyloxyacyl Hydrolase, a Leukocyte Enzyme (Munford et al.); 19. Regulation of Macrophage-Mediated Antigen Presentation by Microbial Products (Ziegler); 20. Complement in Host Defense against Bacterial Infections (Frank).

## V. Antibiotic Resistance

21. Antibiotic Resistance in *Haemophilus influenzae* (Smith); 22. New and Complex Strategies of  $\beta$ -Lactam Antibiotic Resistance in Pneumococci and Staphylococci (Tomasz); 23. Evolving  $\beta$ -Lactamases (Jacoby); 24. Multiple Antibiotic Resistance: Gene Selection, Function, and Spread (Levy).

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# *Pseudomonas*

## BIOTRANSFORMATIONS, PATHOGENESIS, AND EVOLVING BIOTECHNOLOGY

Edited by **Simon Silver** and **Ananda M. Chakrabarty**, *University of Illinois College of Medicine, Chicago*; **Barbara Iglewski**, *University of Rochester, Rochester, New York*; and **Samuel Kaplan**, *University of Texas Medical School, Houston*

Scientific interest in the genus *Pseudomonas* is now as multifaceted as the organisms themselves. Pseudomonads are variously pathogens of plants and animals, including humans; producers of siderophores which are beneficial to plants; natural scavengers whose activity results in biodegradation and removal of many natural and synthetic compounds; extremely useful systems for the study of metabolic pathways, gene structure, and gene expression; and producers of interesting industrial products. Because *Pseudomonas* species are so extremely important, there has been an explosive growth in research and information during the past several years, and state-of-the-art research methods are being applied to their fullest potential in these investigations.

All major aspects of *Pseudomonas* research, as well as investigations of several closely related bacteria, are encompassed in this review of the field, which had its origins in the third international symposium, "Pseudomonas 89," held in Chicago, Ill. Included are reviews of biochemical, biophysical, genetic, and molecular studies. What emerges is a true reflection of the extraordinary amount and types of available information on this important genus.

### CONDENSED CONTENTS

#### Preface (Silver)

#### Introduction (Silver and Chakrabarty)

**I. Pathogenesis** (4 chapters by Vasil et al., Zielinski et al., Ohman et al., and Iglewski et al.)

**II. Plant-Bacterial Interactions** (6 chapters by Mills and Mukhopadhyay, Chatterjee et al., Weisbeek et al., Mindrinos et al., Schott et al., and Keller et al.)

**III. Biotransformations** (12 chapters by Davies et al., Furukawa et al., Gibson et al., Nakazawa et al., Witholt et al., Rodwell et al., Davison et al., Schell, Burns et al., Schlömann et al., Spain, and Ornston et al.)

**IV. Plasmids, Vectors, Gene Mapping, and Cloning** (7 chapters by Morales et al., Davison et al., Miller et al., Holloway et al., Lessie et al., Chang et al., and Haas et al.)

**V. Cell Envelope and Transport** (5 chapters by Trias and Nikaido, Siehnel et al., Paranchych et al., Sano et al., and Cervantes and Silver)

**VI. Honorary Pseudomonads** (4 chapters by Penfold and Pemberton, Neilands, Kaplan and Suwanto, and Friedrich et al.)

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The latest edition of ASM's renowned guide for the clinical laboratory will be off the presses and ready for shipment in Spring 1991. The *Manual of Clinical Microbiology, Fifth Edition*, has been **completely revised and reorganized and expanded by over 200 pages** to keep pace with new developments and technologies. Like the previous editions, this volume is sure to become the "must have" reference for clinical microbiologists, infectious disease specialists, pathologists, medical technologists, clinicians, and students and educators who have a special interest in clinical and diagnostic microbiology, public health laboratory procedures, and epidemiology.

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